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FIRST PERSON

First person – Maitreyi Rathod and Sushmita Chatterjee

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping early-career researchers promote themselves alongside their papers. Maitreyi Rathod and Sushmita Chatterjee are co-first authors on 'Mannose glycosylation is an integral step for NIS localization and function in human breast cancer cells', published in JCS. Maitreyi conducted the research described in this article while a PhD student in Dr Abhijit De's lab at the ACTREC, Tata Memorial Centre, Navi Mumbai, India. Sushmita is now a a postdoctoral fellow in Prof. Dan Peer's lab at Tel Aviv University, Israel, investigating the use of RNAi in ovarian cancer and in order to target chemo-resistant ovarian cancer cells.

Sushmita Chatterjee

How would you explain the main findings of your paper in lay terms

N-linked glycosylation is well known for its role in intracellular protein trafficking. It is referred to as the sweet code of protein folding. Just as the postal address on letters ensures delivery to the correct destination, many proteins also have different glycan tags, which define their destination. NIS is an iodine transport protein, and often reported to be present in the cytoplasm and not on the membrane in breast cancer cells, impacting on intracellular iodine transport function. This is the core research question addressed in our study. The N-glycosylation process that starts in the endoplasmic reticulum (ER) and gets completed on its way to the Golgi complex is a dynamic process for most membrane-bound proteins, including NIS. By using an experimental cell model, we show that, when NIS is not expressed at its desired location, i.e. on the plasma membrane, its transport from ER to Golgi is compromised. After assessing this transport defect, we also show differences in the expression of global glycosylation-processing molecules in cancer cells, where NIS is either located on the membrane or the cytosol. Of the glycosylation processing molecules, the functioning of mannosidase enzymes is confirmed as the root cause impacting on glycan processing of NIS.

Maitreyi Rathod

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Were there any specific challenges associated with this project? If so, how did you overcome them?

One of the major challenges associated with the study was to follow nascently synthesized NIS in different cellular organelles. To overcome the challenge involved in monitoring this dynamic

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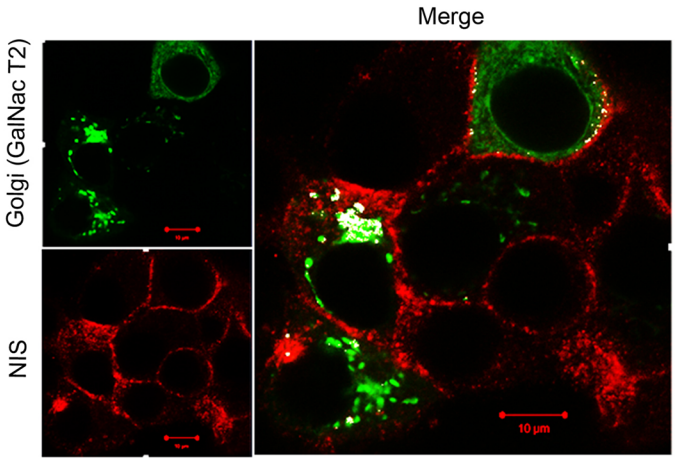

Colocalization of NIS (red) and GalNac T2 (green) in the Golgi.

processing of NIS, we planned the disruption of the Golgi complex by using brefeldin A and then followed the path of NIS, as we allowed the Golgi to be restored in a time-dependent fashion.

When doing the research, did you have a particular result or 'eureka' moment that has stuck with you?

MR: We had several eureka moments during this journey. When we were establishing MCF-7 cells that overexpress NIS protein, very strikingly, we found two distinct types of clone, one showing cytoplasmic localization, the other membrane localization of NIS. This opened up the whole idea of challenging the dogma of a clinical problem that otherwise would have been impossible to address. These two clonal sets of breast cancer cells formed the core study model here.

SC: This project was full of eureka moments for me. The most significant one was during the screening of NIS-expressing clones, where we observed two distinct populations of cells, one showing cytoplasmic and the other membranous NIS expression. Another Eureka moment was when we tested the role of glycosylation enzyme levels regarding the differential localization of NIS, whose expression was clearly clustered into two distinct cell populations, based on differential localization of NIS. This gave us a clear insight into the role of glycosylation in membrane targeting of NIS.

Why did you choose Journal of Cell Science for your paper?

As cell biologists, we have consulted several comprehensive research articles published in JCS. The features, appearance and the quality of work together was always attractive to us. So when this work matured, JCS was naturally in our mind for publishing the work.

Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?

MR: I would like express sincere gratitude to my PhD mentor Dr Abhijit De, who has been an excellent motivation. He taught me the importance of systematic approaches and thoroughness to pursue a relevant question in science.

SC: This journey would not have come to this beautiful end without the immense support and guidance of my PhD supervisor Dr Abhijit De. In addition, invaluable suggestions from Dr Dibyendu Bhattachryya and the late Dr Rajiv Kalraiya helped us in building up this story.

What motivated you to pursue a career in science, and what have been the most interesting moments on the path that led you to where you are now?

MR: The constant urge to question everything, has formed the base for me to choose this field. The beauty of doing biology lies in its very nature of dynamicity and complexity: a challenge that is energizing enough to continue being a researcher. Curiosity of how cells function, how the complex biological system works in a remarkable orchestral fashion and with a fine balance, has bought me here, as I begin my career as a scientist.

SC: A curious mind is the reason I chose this field. My motivation had always been to think about the goal and the results that might come by overcoming the challenges in the path. My most interesting moments were definitely learning something new, be it a new method, a new theory or learning to work with state-of-the-art instruments. Challenging myself with every new question is what brought me here.

Who are your role models in science? Why?

MR: All those great minds that have made breakthrough discoveries, giving us the cell cycle, apoptosis, the central dogma of biology, organelle trafficking, etc., will always be my motivation to be a good observer and ask the right questions.

SC: My role models are all those respected scientists who never gave up, and who were persistent even after several failures and setbacks, leading to breakthrough innovations.

What's next for you?

MR: I am expecting complete my PhD this year and plan to take up a post doctorate position in some cutting-edge lab with ongoing research in the cancer cell biology area.

SC: Personally, my next goal is to complete ongoing research and aim for their publication.

Tell us something interesting about yourself that wouldn't be on your CV

MR: I go shopping whenever I feel blue. Cooking and traveling are amongst my favorite hobbies.

SC: I love to travel and trek in offbeat places. In my spare time, I like to read and stay updated about climate change and politics.

Reference

Rathod, M., Chatterjee, S., Dutta, S., Kalraiya, R., Bhattacharya, D. and De, A. (2019). Mannose glycosylation is an integral step for NIS localization and function in human breast cancer cells. *J. Cell Sci.* **132**, 232058. doi:10.1242/jcs.232058